Creating 3D Character Models for the Game Industry

An Honors Thesis (HONR 499)

by

Emma Mills-Rittmann

Thesis Advisor

Andy Beane

Ball State University

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Abstract

In the past century, technology has advanced considerably and has naturally affected the world on a global scale. New technology has forever changed the entertainment industry and how people experience it. This paper documents my experience when creating three 3D models that are videogame industry standard. I will also be explaining the artistic process which I followed and how it relates to my field of study.

Acknowledgements

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Process of Analysis Statement

Majoring in Animation

Animation is a very diverse major that allows for several different ways of artistic expression. Saying that you are an animation student could mean many things. For instance, it could mean that you are interested in working on films, videogames, or medical animation. It could also mean you are a 2D artist or a 3D artist. Whether this means you are a visual developmental artist to a technical artist, there is no shortage of specializations within the field. Ball State's animation program allows its students to try a variety of different specializations in hope that they can find the right field for them. As a junior, I discovered I was interested in 3D modeling, and by the time I came to my senior project, I knew I wanted to model 3D characters.

Preparation

Before starting my senior project, there was some preparation that needed to be done in order to help ensure the success of my project. I met with my advisor and together we discussed what was to be expected of me. Because I was interested in 3D modeling, I needed to specify which industry I wanted to make characters for, as different industry's have different requirements and standards. Ultimately, I chose to make three different 3D characters for videogames, which I would put into a demo reel at the end of the semester. My advisor and I created a schedule that I was to follow for the entire semester, which had deadlines for critique days as well as final due dates. With everything in order, I started my project.

Pre-Production

The process in which I made my 3D models generally followed the 3D production pipeline. The 3D production pipeline is a streamlined process that many animation industries tend to follow when creating various projects. Some may use a variation of this process, but regardless, is still used upon entering the industry. The pipeline consists of three different stages of development: pre-production, production, and post-production. Because I was primarily focusing on 3D modeling, I did a variation of this process instead of following the entire 3D production process that one would normally use when creating a film or a videogame. Starting with pre-production, I needed to decide what 3D model I was going to make, and in what kind of style. I spent a very large time searching the internet for various images and concept art that I could use as a reference when creating 3D models. After perusing thousands of images, I knew I was going to make an animal, robot, and human inspired models. I found two designs I liked, one of a human-like cat and the other of a robot. Because they were 2D drawings of a character, I spent time with each character figuring out how I would create it in 3D. If I could not see part of the character in the image, like the back of character, then I designed it myself. As for the third model, I decided I would design and draw a humanoid character myself. After I had figured out each design I was going to use, I was able to move on to the production phase of the process.

Production

Designs in hand, the next step was to figure out how to begin creating the models. There are a few different computers programs I could have used which all have several different ways to achieve the same result. For the past three years, I had been taught using the program Maya, so I decided to start there. To describe what it is like to model something 3D, it is like sculpting

with clay, although with a few extra steps and a whole lot less intuitive. I first brought in pictures of the designs I was going to create into the program, and then I began blocking out the shape of the character. Once I blocked out the character, I switched to focusing on small details, such as trying to get a proper silhouette of the model.

The first model or mesh created, especially when sculpted or formed with shapes, is often poorly made or contains too many polygons. Every mesh has polygons and you can think of them as building blocks to every 3D model. However, the more polygons, the more storage space the model takes up. Due to video games needing to have optimal 3D models in order to run quickly, it is best for the models to be 10k polygons or lower, which often leads to the first model you create to be made again. Fortunately, you do not need to start from scratch, and can use the first model to help create the next model. I did several iterations of the same 3D model, making many tweaks to each one in order to ensure I'd have many models I could choose from. It is a tedious process, but nevertheless is important to do.

I tried to optimize the model's polygons, so that they would be as low as possible, while still retaining the necessary detail for the character. Sometimes characters with low polygons will not have enough detail, however I could fix this with a normal map. I did not completely understand how normal maps worked prior to this project, but after some research, I was able to create one. I created a normal map by creating a more detailed 3D model with higher polygons of the same character and transferring it to the lower polygon character. I used another program called Substance Painter to make this normal map, which I then plugged back into the main mesh in Maya. The 3D model was officially done, but I could still do more.

So once the model was created and polygons were lowered to 10k faces or more, I could move on to texturing the character. In order to do this, I UV mapped the character, which is the

process of showing the program how the 3D model should read a 2D texture. Afterwards, I exported the model back to Substance Painter, used this texturing program to give the models color, and sent it back to Maya. I then used Maya to animate the character's in a basic 3D turnaround for 168 frames, lit the scene, and then rendered it out.

Post-Production

Once I had rendered out the 168 frames, I could then take them into post-production. I brought them into another program called After Effects and composited them. I altered the footage by adding color and lighting corrections, and then rendered it out as an AVI file. I did this several times, and once I had a video file for each model, I compiled them once more into a demo reel to submit as my final senior project.

Reflection

Initially when beginning my senior project, I was not that concerned. I figured I had given myself more than enough time to complete everything I had imagined I needed to do. However, when I was part way through the semester, I suddenly became very aware what a daunting task I had made for myself. I had initially hoped I could learn a new program, rig every character to be usable, pose them, and make multiple textures for each model. While it may have been possible, I also realized what an absorbent amount of time this would cost me, and that both my work and life would suffer in other ways, which lead me to decide against it. Instead, I decided to try to focus more on my specialization. I focused on making several iterations of my 3D models and figuring out a good process for me when making a model in Maya.

Towards the end of the semester, I spent a great deal trying to learn more about the programs I was working with. Despite feeling familiar with Maya, there is still so much about the program I do not know. I learned more about different shaders, which is a type of texturing in Maya, baking maps into meshes, as well as a more proper ways to create and optimize a 3D model mesh. I also learned more about Substance Painter which I had even less experience with, but at the very least am now comfortable with importing meshes into. I still do not feel comfortable with texturing in the program, but with a little more time, I'm sure I will be. The one program I had hoped to use to create a 3D model this semester was Zbrush. Zbrush is digital program where artists can sculpt in 3D and is exceptionally beneficial to 3D artists, however, the interface was too difficult for me to pick up on quickly. I watched several videos for beginners about the program online but still struggled with using the program. I decided I would continue to model in Maya to be able to create the models more quickly but continued to learn Zbrush on the side. I plan to work with Zbrush more in the future, because I think it will massively improve my character models. Lastly, I used Unreal, which is a game engine that I uploaded my 3D models into. I used the program briefly to make sure that I could transfer my models to and from the different programs without a problem.

I learned a lot working on these 3D character models, especially when it came to what I could have done better. It was only after I messed up modeling a character a few times when I realized a better or more efficient way to get the same result. For instance, I did not block in my first character, a mistake which lost me a lot of time.

Another skill I used when working on my project is how to both search for as well as ask for help. Maya is a program that frequently has problems, and sometimes I would get stuck on a technicality. I spent a lot of time researching and brainstorming how to fix the problems. When I

could not figure out an issue, I would either go to a forum to ask for help or ask my teacher.

Overall, I was pleased with how I spent my semester. While working on my senior project, I felt I was consistently using the education that the past three years of animation classes had taught me. While there were several bumps throughout the semester, such as hitting weeks where I wanted to give up, or stop trying, I eventually was able to get myself back on track. While sometimes I wish I had spent my time more wisely, focused on Zbrush, or made better textures, I also think that the work I did produce was decent and I laid a solid foundation for future projects. I think I have a lot I can build on and hope to do so in the future. The more I modeled 3D characters, the more I realized I enjoyed modeling. Despite still wishing to continue to work on 3D models, I also know that other skills are important to cultivate; Skills such as drawing, designing, texturing, lighting, rendering, and compositing. In the future, I would also like to dedicate more time to those areas of expertise as there's still so much more to learn.

Digital Supplements

- https://vimeo.com/333126322
- Password: SeniorPRJ
    - Or please refer to USB drive attached

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